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A NEW IMPROVE METHOD FOR SOLVING TRANSPORTATION PROBLEM

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ABSTRACT

In this paper we introduced the new improve method to solve the transportation problem and get the solution which is similar to the optimum solution .

KEYWORDS: Initial Feasible Solution, Lowest Cost Entry Method, MODI Method, North-West Corner Method, Optimality,Vogel's Approximation Method

1.1 INTRODUCTION

The optimization techniques in mathematics, computer science and economics are solving successfully by choosing the most excellent element from set of accessible alternatives elements. Linear programming is a method of finding capital in an optimal way. Most widely used operations research equipment and has been a decision making aid in almost all manufacturing industries and in financial and service organizations. Generally, an important and successful application in the optimization refers to transportation problem. Transportation problem is a extraordinary case of the linear programming problem in the operation research**[24].** The major aim of transportation problem solution methods is to minimize the cost or the time of transportation. Basically, the purpose is to minimize the cost of shipping goods from one location to another so that the needs of each arrival area are met and every shipping location operates within its capacity. Transportation problem also referred as "**distribution model** or the **transportation model**". The name **transportation model** is, however, misleading because this model can be used for a wide variety of situations such as preparation, manufacture, asset, plant site, inventory control, service scheduling, human resources assignment, construction mix problem and many others, therefore the model is virtually not enclosed to transportation or distribution only**[18].**

The origin of transportation models came in existence to **1941**when **F.L. Hitchcock[17]** represented his work named as "*the distribution of a product from several sources to numerous localities*." The arrangement is regarded as the first significant part of transportation problems to find the solution. Six years later, in **1947**, **T.C. Koopmans[20]** represented his work named "*optimum exploitation of the transportation system*." The above two researcher's work are notably accountable for the growth of transportation problems which involve a number of shipping starting place and a number of destinations. Each shipping starting place has a definite efficiency and each objective has a definite requirement associated with assigned cost of starting place from the source to the destinations. Transportation models are used to optimize the total cost of transportation.

1.2 PROBLEM AND FORMULATION

In this section we introduce a general transportation problem which solved by the regular solution methods of transportation as North West Rule, Lowest Cost Method and Vogel's Approximation Method

Example 1

Satyam manufacturers with facilities in various places have manufacturing plants in Kalikat denoted by letter K, Banaras by letter B, and Manglore by letter M. On a normal working day, the usual daily production for these three plants is 1 for Kalikat plant, 3 for Banaras and 4 for Manglore plant. In addition, this company has three warehouses located in Vashi denoted by letter V, Chadanpur denoted by letter C and Narsi by letter N. These warehouses have a daily requirement of 4 units for Vashi, 2 units for Chadanpur and 2 units for Narsi. The following table 3.1 gives a summary of shipping cost per unit[28].

Table 1

		Warehouses		
Plant		V	C	N
	K	50	30	220
	B	90	45	170
	M	250	200	50

Table 2: North-West Corner Method (NWCM)

From to	**V**	**C**	**N**	**Availability**
K	$\boxed{1}$ 50	30	220	1
B	$\boxed{3}$ 90	$\boxed{0}$ 45	170	3
M	250	$\boxed{2}$ 200	$\boxed{2}$ 50	4
Requirement	4	2	2	**8**

Thus, the total cost becomes: (1*50) + (3*90) + (0*45) + (2*200) + (2*50) = Rs **820**

Table 3: Least Cost Method

From to	**V**	**C**	**N**	**Availability**
K	50	$\boxed{1}$ 30	220	1
B	$\boxed{2}$ 90	$\boxed{1}$ 45	170	3
M	$\boxed{2}$ 250	200	$\boxed{2}$ 50	4
Requirement	4	2	2	**8**

The total cost in this method will be obtained as follows:

Total cost = (1*30) + (2*90) + (1*45) + (2*250) + (2*50) = **Rs. 820**

Vogel Approximation Method

Vogel's approximation method is also known as the penalty method. This method used to penalty procedure to find a basic feasible solution of the transportation problem.

Using the Vogel's Approximation method, the basic feasible solution can be obtained as shown in table below:

Table 4

From to	V	C	N	Availability
K	**1** 50	30	220	1
B	**3** 90	**0** 45	170	3
M	250	**2** 200	**2** 50	4
Requirement	4	2	2	**8**

The total cost in Vogel method can be established as,

Total cost = (1*50) + (3*90) + (0*45) + (2*200) + (2*50) = Rs. **820**

PERFORM OPTIMALITY TEST: Now we Find Optimal Solution using Modi Method

Table 5

From to	V	C	N	Availability
K	**1** 50	30	220	1
B	**3** 90	**0** 45	170	3
M	250	**2** 200	**2** 50	4
Requirement	4	2	2	**8**

In this case, the total cost will be obtained as follows:

Total cost = (1*50) + (3*90) + (0*45) + (2*200) + (2*50) = **820**

Here we find the different solution by different method.

NEW IMPROVED METHOD

In this section we present a detailed example to illustrated the steps of the proposed improved method.

Step 1:-Select the least cost value for the matching origins K, B, M are 30, 45 and 50 which represents the target C, C and N respectively which is shown as following:

Column 1KBM

Column 2CCN

Step 2:-Now the target N is small for source 2 and assign the chamber (M, M) min (4, 2) = 2.

Table 6

From to	V	C	N	Availability
K	50	30	220	1
B	$\boxed{90}$	45	170	3
M	250	200	$\boxed{2}$ 50	4-2
Requirement	4	2	2	**8**

Step 3:- Now delete column M as for this target demand. Next the least cost value for the matching sources K, B, M are 50, 45 and 200 which represents the destination V, V and M respectively which is shown as follows:

Column 1KBM

Column 2VCC

Now the target are not identified because origin K, B, M have same target N. so the difference between least and next least unit cost for the origin K, B and M. The differences are 20, 15 and 50 respectively for the sources K, B and M.

Step 4:- Now the highest difference is 50 which represents origin M. Then assign the chamber (K, M), min (2, 2) = 2 which is shown as in the Table:

Table 7

From to	V	C	Availability
K	50	30	1
B	$\boxed{90}$	45	3
M	250	$\boxed{\mathbf{2}}$ 200	2-2
Requirement	4	2	**8**

Step 5:- Eliminate column C and then crossed it. Further, adjust supply as **(50-35) =15.**Then, find the minimal unit cost for the compeerorigin K, B and M are 50, 90 and 250 respectively which denotes the target C, C and C respectively which is given in Table

Column 1KBM

Column 2VVV

Now the origin K, B, M have the sametarget C, and find least difference. Although only one column remain and hence least difference cannot be obtained. Assign the remaining availability 1, 3 and 0 to chambers (K, V) (B, V) and (M, V) which is shown in Table

Table 8

From to	V	Availability
K	**1** 50	1
B	**3** 90	3
M	**0** 250	0
Requirement	4	**8**

Step 6:-Now (3+3-1) =5 chambers are assigned and find the possible answer. Calculate the total price as some of the product of price and allocated value of availability and requirement which is shown in Table

Table 9

From to	V	C	N	Availability
K	**1** 50	30	220	1
B	**3** 90	45	170	3
M	**0** 250	**2** 200	**2** 50	4
Requirement	4	2	2	**8**

Total cost= (1*50) + (3*90) + (0*250) + (2*200) + (2*50) = 820

New improved method gives the same solution as that of optimal solution obtained by using NCM, LCM, VAM and MODI method. Thus our method also gives optimal solution.

CONCLUSIONS

The improved Method is convenient in use and as it help us to get the solution more nearer to the optimum solution .The requirement of optimization of the transportation cost ,or the optimum solution for the problem is achieved by the substitute Method.

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